KUBOTA Submerged Membrane Unit for MBR Technologies

For Earth, For Life

February 2017
Kubota Corporation

- Kubota was established in 1890.
- We are globally challenging problems on Water, Food and Environment.

<table>
<thead>
<tr>
<th>Corporate Name</th>
<th>Kubota Corporation</th>
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<tbody>
<tr>
<td>Head Office</td>
<td>Osaka, Japan</td>
</tr>
<tr>
<td>Established</td>
<td>1890</td>
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<tr>
<td>Board of Directors</td>
<td>President and Representative Director Masatoshi Kimata</td>
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<tr>
<td>Capital</td>
<td>764 million USD (1USD=110JPY) as of March 31, 2015</td>
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<tr>
<td>Sales / Revenue</td>
<td>14.4 billion USD (Consolidated) (Fiscal Year Ended March 31, 2015)</td>
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<tr>
<td>Employees</td>
<td>36,233 (Consolidated) as of March 31, 2015</td>
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- Global Expansion: More than 110 countries
- Overseas Sales: Approximately 60%

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Kubota MBR Advantage - Reusable Permeate

MBR Permeate can be directly reused for toilet flashing, watering and irrigation, without complicated post treatment.

CAS
(Conventional Activated Sludge)

- Aeration Tank
- Sedimentation Tank
- Sand Filter
- Activated Carbon
- Disinfection
- Discharge Tank
- Reuse

MLSS: 2,000 ~ 6,000 mg/L

MBR
(Membrane Bioreactor)

- MBR
- Coagulation
- Sand Filter
- Micro-Filtration/ Ultra-Filtration
- Disinfection
- Discharge Tank
- Reuse

MLSS: 8,000 ~ 18,000 mg/L

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Kubota MBR Advantage - Compact Treatment System

MBR can increase the concentration of the activated sludge, which makes the reactor tank size smaller than others.

- **CAS**
  - MLSS: 2,000~6,000mg/L
  - Tank Size: Low to Small

- **Kubota MBR Flat sheet**
  - MLSS: 8,000~18,000mg/L
  - Tank Size: High to Small

Higher MLSS reduce the tank size.
Kubota MBR - History and Installations around the World

- Kubota started MBR business in 1986, 30 years experience and know-how in MBR technology.
- Now Kubota have more than 5,500 references all over the world.
- In Middle East, we have 85 references since the first installation in 2003.

Kubota have more than 1,500 references in industrial wastewater.
Kubota MBR - Structure of Kubota SMU

Kubota Submerged Membrane Unit is designed to maximize the performance of Membrane Cartridges.

Units are installed in the Membrane Tank. Treated water permeating the Membrane Cartridges is discharged through Tubes and Manifold.

- **Material**: Chlorinated Poryethyen
- **Average Pore Size**: 0.2 µm
- **Dimension**: 0.5 m x 1.0 m or 1.5 m
- **Filtration Area**: 0.8 or 1.45 m²/sheet

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Feature of Kubota MBR - Simple System and Structure

KUBOTA Submerged Membrane Unit™ requires fewer peripherals and simpler configuration, which brings easier control and maintenance.

- Gravity Filtration (no need for Permeate Pump)
- No need for Backwash Equipment
- No need for Chemical Cleaning Tank

KUBOTA Submerged Membrane Unit™
### Feature of Kubota MBR - Easy Operation & Maintenance

<table>
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<tr>
<th>Frequency</th>
<th>Task Description</th>
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<tbody>
<tr>
<td>Once a day (5 minutes)</td>
<td>• Filtration pressure check&lt;br&gt; • Diffuser cleaning (explained below)</td>
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<tr>
<td>Every 2~6 months (3 hours)</td>
<td>• Chemical cleaning (automatically)</td>
</tr>
<tr>
<td>Once in 5 – 10 years</td>
<td>• Membrane Cartridge replacement</td>
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**Diagram Explanation**

- **Valve Closed**
  - Normal operation
  - Air flow

- **Valve Open**
  - Diffuser cleaning
  - Air flow
  - Sludge (in Diffuser Cleaning)
Feature of Kubota MBR - High Durability & Long Lifetime

Name: Porlock Sewage Treatment Plant
Volume: 1,900 m³/d
Commissioning: 1998 (First MBR Plant in Europe)
Near Exmoor National Park and swimming beach

94% of the Membranes are still working without replacement.

Membrane Life: > 10 years
1. Al Ansab STP- Largest MBR in the Middle East

Type of Wastewater: Sewage
Country: Oman
Capacity: 125,000 m$^3$/d (will be upgraded to 150,000 m$^3$/d)
Commissioning: 2016
Feature: Middle East’s Largest MBR & Upgrade from 57,000 m$^3$/d
Recycled for irrigation (local landscaping)
2. Canton Water Reclamation Facility– Kubota Largest MBR

- Type of Wastewater: Sewage
- Country: USA
- Capacity: 160,000 m$^3$/d
- Commissioning: 2016 for 1$^{st}$ MBR Tank
- Feature: Kubota’s largest reference throughout the world
- Phosphorus regulation as 1mg/L, and future regulation of T-N
3. Al Marai ETP – Large Industrial and High COD influent

- Type of Wastewater: Dairy (Industrial Wastewater)
- Country: Saudi Arabia
- Capacity: 8,000 m³/d (upgraded from 4,000 m³/d in 2016)
- Start up: 2006
- Influent COD is over 2,000mg/L
- No Cartridges replacement over 9 years operation

Membrane Basin

Plant Overview

Influent and effluent water

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Thank you for your attention.